ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Internet www.etadanmark.dk

Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

MEMBER OF EOTA

European Technical Assessment ETA-21/0498 of 2021/06/29

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 66 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	Hilti Firestop Coating CFS-CT with TROX FK2-EU / FKRS-EU fire dampers
Product family to which the above construction product belongs:	Fire stopping and fire sealing product - Combined penetration Seal
Manufacturer:	Hilti AG Feldkircherstrasse 100 FL-9494 Schaan Principality of Liechtenstein www.hilti.com
Manufacturing plant:	Hilti production plant 4a Hilti production plant 17
This European Technical Assessment contains:	27 pages including 4 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, based on:	European Assessment Document (EAD) No. EAD 350454-00-1104-v01: Fire stopping and fire sealing products – Combined penetration seals for dampers
This version replaces:	-

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product

The Hilti Firestop Coating CFS-CT with TROX FK2-EU / FKRS-EU fire dampers are Hilti Firestop Coating CFS-CT or Hilti Firestop Coating CP 673 which is applied either on site onto a mineral wool board or used in the form of the Hilti Firestop Board CFS-CT B (pre-coated with Hilti Firestop Coating CFS-CT) or Hilti Firestop Board CP 673 (pre-coated with Hilti Firestop Coating CP 673) installed in a combined penetration seal with type FK2-EU and FKRS-EU fire dampers.

Hilti Firestop Coating CFS-CT
A detailed specification of the product is contained in document "Identification / Product Specification relating to the European Technical Assessment ETA-11/0429 - Hilti Firestop Coating CFS-CT" which is a non-public part of this ETA. The Hilti Firestop Coating CP 673 is technically identical to the Hilti Firestop Coating CFS-CT.

Hilti Firestop Board CFS-CT B 1S
Hilti Firestop Board CFS-CT B 1S is a mineral wool board pre-coated on one face with Hilti Firestop Coating CFS-CT. The thickness of the coating is 0.7 mm.
A detailed specification of the product is contained in document "Identification / Product Specification relating to the European Technical Assessment ETA-11/0429 - Hilti Firestop Board CFS-CT B 1S" which is a non-public part of this ETA. The Hilti Firestop Board CP 673 is technically identical to the Hilti Firestop Board CFS-CT 1S.

TROX FK2-EU / FKRS-EU fire dampers
The fire dampers are used as safety related components in ventilation systems. The fire damper is used as a shutoff device to prevent fire and smoke from spreading through ducting. During normal operation the damper blade is open to enable air passage through the ventilation system.

If the temperature increases in the event of a fire, the damper blade closes. Release is triggered at 72 °C (95 °C in warm air ventilation systems). If the damper blade closes due to a temperature increase (i.e., in the event of a fire), it must not be reopened.

The TROX FK2-EU / FKRS-EU fire dampers are CE marked in accordance with EN 15650 as specified in DoP/FK2-EU/DE/002 and DoP/FKRS-EU/DE/004 respectively from TROX GmbH.

Ancillary Products

Hilti Firestop Acrylic Sealant CFS-S ACR
Hilti Firestop Acrylic Sealant CFS-S ACR is a one-component product and is composed essentially of filling substances and an acrylic binder.
It is available in cartridges 310 ml, foil pack 580 ml, bucket 5 l /19 l.
Suitable dispensers:
- Hilti Dispenser CFS-DISP
- Hilti Cordless caulking dispenser CS4-A22
- Hilti Dispenser CS 270-P1

For specification and further details see ETA-10/0292.

Hilti Firestop Wrap Strip CFS-W P
Hilti Firestop Wrap Strip CFS-W P is a graphite-based pipe closure device installed around insulated and uninsulated plastic pipes to form a penetration seal designed to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.
The Hilti Firestop Wrap Strip CFS-W P is supplied as a 10 m roll, 50 mm wide and 2 mm thick and is cut to size to suit a specific pipe diameter.
Depending on the pipe diameter several layers may be necessary – for details see Annex B (layer groups).
For specification and further details see ETA-20/0989.

Hilti Firestop Collar Endless CFS-C EL
The inlay of the Hilti Firestop Collar Endless collar consists of one intumescent strip with a soft polyurethane foam layer as a noise decoupling element.
The Hilti Firestop Collar Endless CFS-C EL is supplied as a 2580 mm roll with 52 mm wide and is cut to size to suit a specific pipe diameter.
Hilti Firestop Collar Endless CFS-C EL to be installed against the wall utilizing the specified number of fixing hooks. The required number and type of hooks (short hooks only) is shown in Annex B.
For specification and further details see ETA-14/0085.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The construction product Hilti Firestop Coating CFS-CT with TROX FK2-EU / FKRS-EU fire dampers is assessed on the basis of EAD 350454-00-1104-v01 as a fire stopping product, as combined penetration seal.

The construction product as combined penetration seal is intended for use as a component with a fire protection effect in building elements, assembled

systems or constructions that are subject to requirements related to fire protection.

The fire-resistant penetrations for fire dampers to be used in resistance to fire classified walls.

The product is intended to allow the penetration sealing of more than one service (e.g., cables, pipes, conduits, fire dampers) in the same penetration.

For the maximum opening size of the penetration see Annex A.

For the separating elements see Annex A.

The separating elements shall be constructed as prescribed in the EN 1366-3 (see 7.2.2 standard supporting constructions).

More information in table, bullet point 3: “Performance of the product and references to the methods used for its assessment”.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the Hilti Firestop Coating CFS-CT with TROX FK2-EU / FKRS-EU fire dampers of 25 years, provided the manufacturers conditions laid down in the manufacturers data sheet for the packaging, transport, storage, installation, use, maintenance and repair are met.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by the Technical Assessment Body issuing an ETA, but are regarded only as means for expressing the expected economically reasonable working life of the product.

3 Performance of the product and references to the methods used for its assessment*

Characteristic	Assessment of characteristic
3.1 Safety in case of fire (BWR2)	
Reaction to fire	Hilti Firestop Coating CFS-CT on a mineral wool board board fulfils the requirements for reaction to fire class D- s2, d0 according to EN 13501-1. The reaction to fire classification of the mineral wool board used for Hilti Firestop Board CFS-CT B is class A1. The fire dampers are made from steel classified steel as performance class A1 of the characteristic reaction to fire, in accordance with the provisions of Commission Delegated Regulation 2016/364 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC.
Resistance to fire	Classification according to EN 13501-2, see Annex B for further information on configuration of combined penetration seals
3.2 Hygiene, health and the environment (BWR3)	
Content, emission and/or release of dangerous substances	The concentration of total emission of SVOC: **After 3 days: less than 0,005 mg/m³** **After 28 days: 0,005 mg/m³** The concentration of total emission of VOC: **After 3 days: 820 mg/m³** **After 28 days: 290 mg/m³**
Air permeability (material property)	**No area specific leakage rate measurable. No failure until pressure differential of 9750 Pa.**
Water Permeability (material property)	**Water tight to 1000 mm head of water or water tight to 9806 Pa.**
3.3 Safety in use (BWR4)	
Mechanical resistance and stability	**Type IV**
Resistance to impact/movement	**Type IV**
Adhesion	**Type IV**
Durability	Use condition: **Y_2**
3.4 Protection against noise (BWR5)	
Airborne sound insulation	**See annex C**
3.5 Energy Economy and heat retention (BWR6)	

Characteristic	Assessment of characteristic
Thermal properties	**Hilti Firestop Coating CFS-CT** The insulation performance of a mineral wool slab is slightly reduced by the coating, 2.2% with one-sided coating, 3.0 to 3.4% with double-sided coating. This has to be considered when selecting a mineral wool board if a required regulatory nominal λ-value has to be achieved. **Hilti Firestop Board CFS-CT B 1S** Thermal conductivity coefficient according to EN 12667 for a double layer of the boards: λ_{10} = 0.039 W/mK.
Water vapour permeability	**No performance assessed**

*) See additional information in section 3.6 – 3.7.

3.6 Methods of verification

The characteristic values of the joint sealing system are based on the EAD 350454-00-1104-v01: Fire Stopping and fire sealing products – Combined penetration seals for dampers.

3.7 General aspects related to the fitness for use of the product.

The European Technical Assessment is issued for the product based on agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide if such changes affect the ETA and consequently the validity of the CE marking based on the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

The assessment is based on the assumption that:

- the operating and installation instructions of the "mixed penetration seal" as specified in the ETA-holders technical dossier are observed.
- the installation details of the operating and installation instructions of the FK2-EU and FKRS-EU fire dampers must be observed for installation in the Hilti penetration seal.

Durability and serviceability:
The verification of durability and serviceability is part of testing the essential characteristics. Hilti Firestop Coating CFS-CT fulfils the requirements of use condition Y_2 in accordance with EAD 350454-00-1104, Section 1.2.1 (intended for use at temperatures between -20 °C and + 70°C, but with no exposure to rain nor UV).

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base.

4.1 AVCP system

According to the decision 1999/454/EC of the European Commission, as amended, the system(s) of assessment and verification of constancy of performance is system 1 (see Annex V to Regulation (EU) No 305/2011).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD.

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2021-06-29 by

Thomas Bruun
Managing Director, ETA-Danmark

Annex A

Resistance to fire classification of combined penetration seals

A.1 General Information

a) The maximum penetration seal dimensions B1 × H1 are 3000 × 2000 mm.
b) The maximum penetration seal dimensions B1 x H1 (3000 x 2000 mm) requires that the first penetrant (non-combustible) must be installed at a distance of ≤ 600 mm. Failing this, the maximum penetration seal dimensions (b1 / h1) are restricted to the dimensions of the fire damper and its perimeter of 600 mm. For more information, see Fig. A3 and Fig. A4 (grey-shaded area).
c) For the minimum distance between the casings of the fire dampers and the ducts, see subsequent tables
d) The minimum distance between the fire damper and the wall is 40 mm.
e) Permitted cables and pipes (see in subsequent tables) may be arranged anywhere in the combined penetration seal in compliance with the specified distances.
f) The position of the fire dampers in the combined penetration seal must comply with the specified distances.
g) All services passing through (fire dampers, cable, cable bundles, cable trays, conduits and plastic pipes) can be laid individually, in multiples or so that they are mixed (mixed penetration seal).
h) Pipes have to penetrate walls/floors in perpendicular (90°) situation only

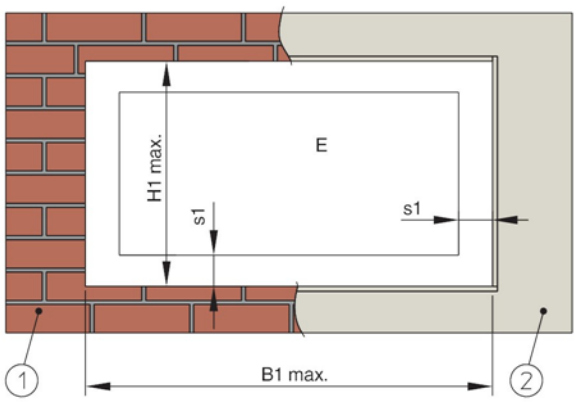
A.1.1 Rigid wall constructions $t_E \geq 100$ mm

Rigid walls made of concrete, concrete or masonry with a minimum density of 650 kg/m³, a minimum thickness of 100 mm.

A.1.2 Flexible wall construction $t_E \geq 100$ mm

The wall shall be a classified wall construction, with a minimum thickness of 100 mm, and shall be made of timber or steel studs covered on both sides with one or more layers of panels with a total thickness of at least 25 mm on both sides of the wall. The installation opening shall be made with surrounding metal profiles. In the case of wooden stud walls, a perimeter wooden frame shall be made. A minimum distance of 100 mm from the seal to each stud must be maintained and the cavity between the stud and the seal must be filled with at least 100 mm of insulation of class A1 or A2 (according to EN 13501-1). Alternatively, the surrounding wooden stud can be clad with two layers of boards with a total thickness of at least 25 mm. Further details on wall construction are given in the operating instructions for the fire dampers.

The separating elements shall be constructed as prescribed in the EN 1366-3 (see 7.2.2 standard supporting constructions)



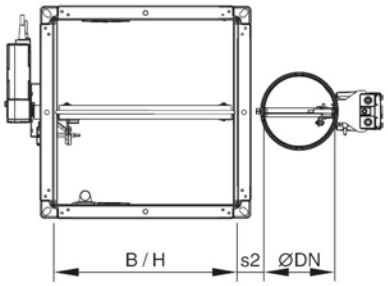


Fig. A.1: General dimensions

1 Solid wall
2 Lightweight partition wall
E Installation area

B1×H1 Max. penetration seal dimensions 3000 × 2000 mm (the permitted penetration seal dimensions are determined using the 600 mm rule)
B×H FK2-EU nominal sizes 200 × 100 – 1500 × 800 mm
ØDN FKRS-EU nominal sizes 100 – 315 mm

Damper combination up to EI 90 S	s1 min. [mm]	s1 max. [mm]	s2 min. [mm]
FK2-EU – FKRS-EU	40	600	≥ 50

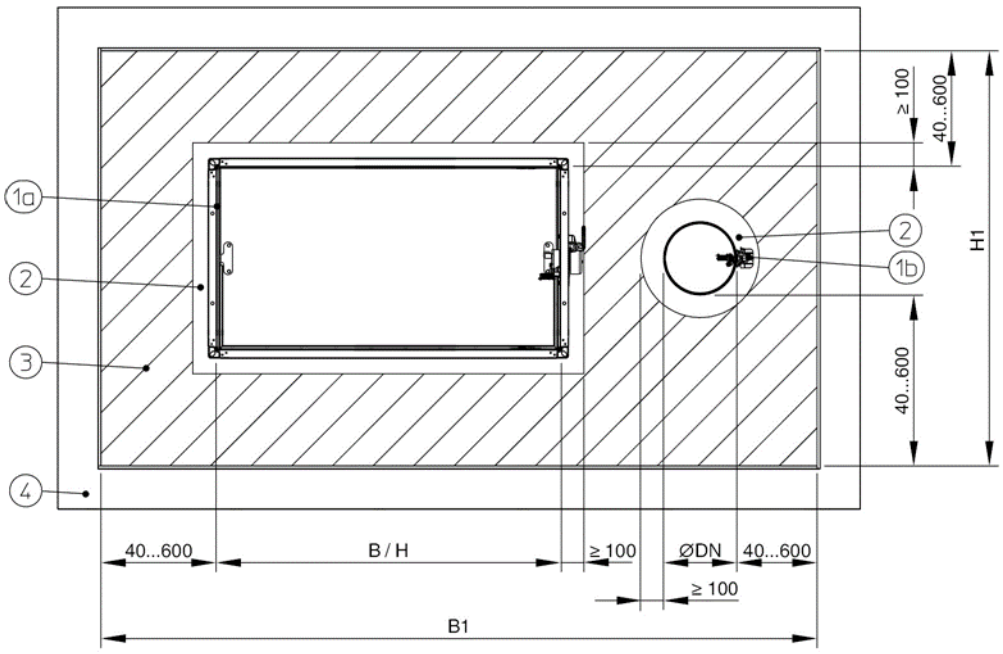


Fig. A.2: Arrangement in the combined penetration seal FK2-EU and FKRS-EU

1a FK2-EU
1b FKRS-EU
2 Minimum distance to other lines (or operating penetrantions)
3 Arrangement of fire dampers and ducts irrelevant, as long as the minimum distances and the distances are maintained according to Fig. A3 and Fig. A4
4 Solid wall or lightweight partition wall with metal or timber support structure as well as half-timbered construction

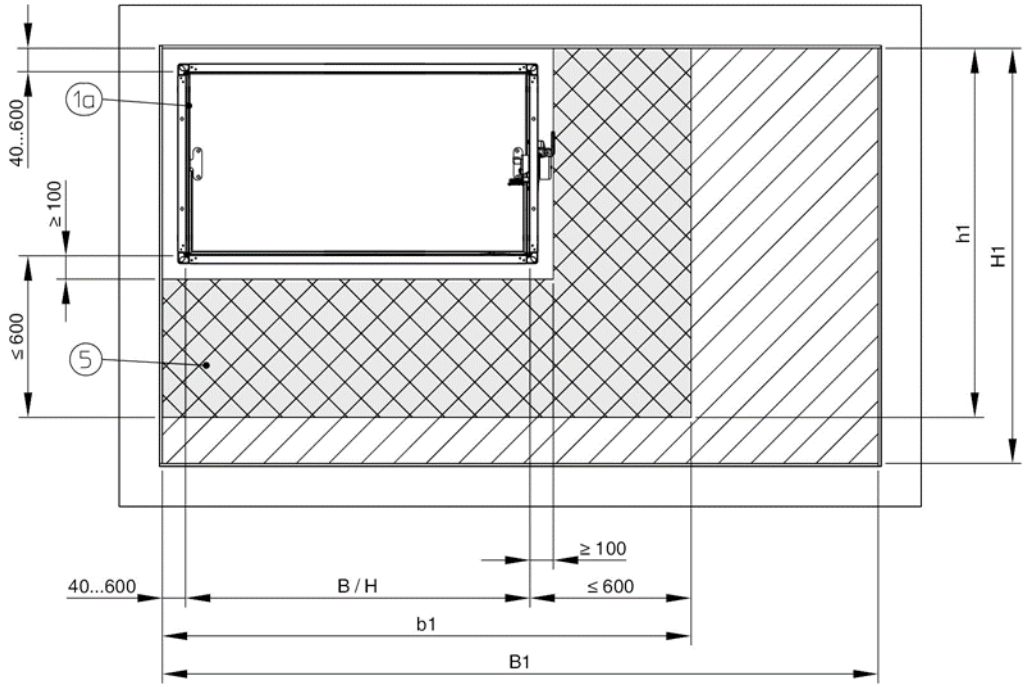


Fig. A.3: Arrangement in combined penetration seal FK2-EU – distances to the first duct

1a FK2-EU

5 Distance to the second duct (600 mm rule). The first penetrant (non-combustible) must be installed at a distance of ≤ 600 mm. Failing this, the maximum penetration seal dimensions (b1 / h1) are restricted to the fire damper and its perimeter of 600 mm (grey-shaded area).

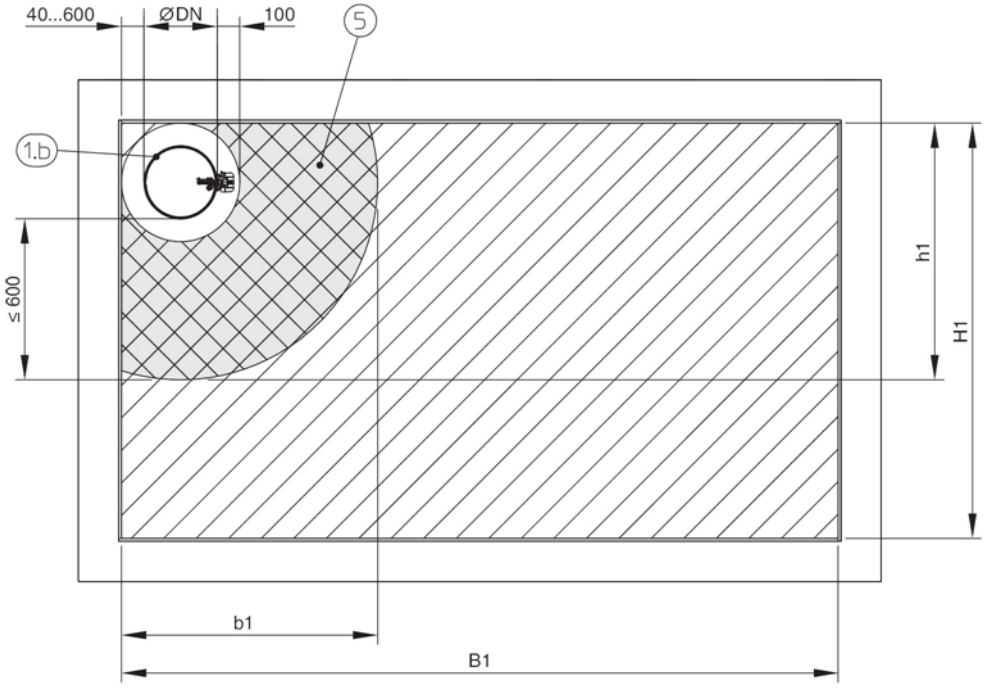


Fig. A.4: Arrangement in combined penetration seal FKRS-EU – distances to first duct

1b FKRS-EU

5 Distance to the second duct (600 mm rule). The first penetrant (non-combustible) must be installed at a distance of ≤ 600 mm. Failing this, the maximum penetration seal dimensions (b1 / h1) are restricted to the fire damper and its perimeter of 600 mm (grey-shaded area).

Distances

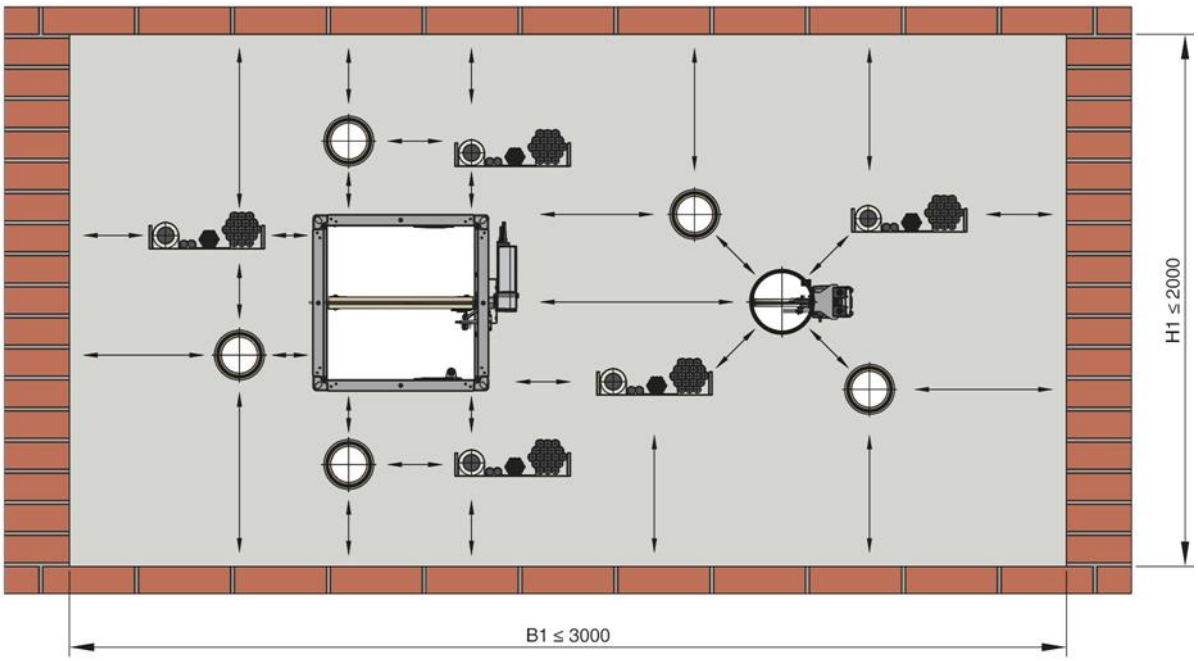


Fig. A.5: Distances of combined penetration seal (marked on solid wall)

Table A.1. Applications with Hilti Firestop Wrap Strip CFS-W P

Distance from – to [mm]	FKRS-EU fire damper	Cables / cable bun-dles / cable trays	Conduits up to Ø16 mm	Plastic pipes	Metal pipes	Aluminium composite pipes	Penetration seal edge
Fire damper FK2-EU	50	85	85	85	85	85	40
Cables / cable bundles / cabletrays	100	0	0	40	20	50	0
Conduits up to Ø16 mm	50	0	0	40	20	50	0
Plastic pipes	50	40	40	30	0	50	17
Metal pipes	50	20	20	0	0	50	3
Aluminium composite pipes	50	50	50	50	50	50	25
Penetration seal edge	40	0	0	17	3	25	–

Table A.2. Applications with Hilti Firestop Collar Endless CFS-C EL

Distance from – to[mm]	FKRS-EU fire damper	Cables / cable bun-dles / cable trays	Conduits up to Ø16 mm	Plastic pipes	Metal pipes	Penetration seal edge
Fire damper FK2-EU	50	85	85	85	85	40
Cables / cable bundles / cabletrays	100	0	0	50	20	0
Conduits upto Ø16 mm	50	0	0	50	20	0
Plastic pipes	50	40	40	200	0	17
Metal pipes	50	20	20	0	0	3
Penetratio nseal edge	40	0	0	0	3	–

Table A.3. Specification for mineral wool boards suitable for being used together with Hilti Firestop Coating CFS-CT

Manufacturer	Product designation
Flumroc	Flumroc 341
Isover	Fireprotect 150
Isover	Orsil Pyro
Isover	Orsil S
Isover	Orsil T
Isover	Protect BSP 150
Isover	Stropoterm
Knauf	HERALAN BS-15
Knauf	HERALAN DDP-S
Knauf	HERALAN DP-15
Paroc	FPS 14
Paroc	FPS 17
Paroc	Pyrotech Slab 140
Paroc	Pyrotech Slab 160
Rockwool	Hardrock II, Hardrock 040
Rockwool	RP-XV
Rockwool	RPB-15, ProRox SL 980

Table A.4. Specification for mineral wool products suitable for being used as additional protection for cables/cable supports and metal pipes according to 1.2 (relevant for Annex 2.6.4.1)

Characteristic	Specification	Unit
Stone wool according to EN 14303		
Reaction to fire class according to EN 13501-1	A1 or A2	-
Thermal conductivity at 20°C	≤ 0.040	W/(mK)
Density	35 - 45	kg/m^3
Surface	Al-foil faced on one side	-
Melting point	> 1000	°C

The following list contains suitable products for additional protection (AP) but may not be exhaustive:

Manufacturer	Product designation
Isover	Ultimate U TFA 34
Knauf	Lamella Forte LLMF AluR
Paroc	Lamella Mat 35 Alu Coat
Rockwool	Klimafix
Rockwool	Klimarock
Rockwool	Rockwool 133 (Lamella mat)

Table A.5. Specification for mineral wool products suitable for being used as pipe insulation.

Interrupted insulation
Stone wool according to EN 14303, class A1 or A2 according to EN 13501-1, Al-faced

Sustained insulation	
Manufacturer	**Product designation**
Isover	Coquilla AT-LR
Isover	Protect BSR 90 alu
Paroc	Section AluCoat T
Rockwool	Conlit Pipe sections
Rockwool	Klimarock
Rockwool	RS 800 pipe sections
TP Termoprodukt	TP-Protect RS 1, TP-Protect RS 105, TP-Protect RS 120, TP-Protect RS 150

Table A.6. Specification for foamed elastomeric insulation products suitable for being used as pipe insulation.

Manufacturer	**Product designation**
Armacell International GmbH	Armaflex AF, Armaflex SH, Armaflex Ultima, ArmaflexXG, Armaflex NH, Armaflex HT
NMC Group	Insul-Tube H-Plus (nmc),
Kaimann GmbH	Kaiflex KK plus, Kaiflex KK, Kaiflex HF plus
L'Isolante K-Flex	l'Isolante K-Flex ECO, l'Isolante K-Flex ST Frigo
Aeroflex NMC Deutschland	Aeroflex HF
Solar, Halkida, Greece	3i - Isopipe HAT
HAT Isolierung Cosmo	Conel Flex HT
Union Foam S.p.A.Bellusco, Italia	Eurobatex
Würth	Flexen Kälteschlauch
Isidem Insulation Istanbul,Turkey	Isidem Coolflex AF

Annex B
Resistance to fire – classifications

The following resistance to fire classification applies to combined penetration seals with TROX FK2-EU / FKRS-EU fire dampers with Hilti Firestop Coating CFS-CT and the installations specified in each section.

B.1 Cables, cable bundles, cable trays, conduits in walls
Applications with EI 90

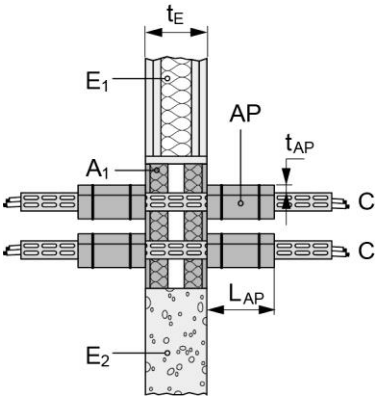


Fig. B.1: Classification with or without cable support systems

Cable	Permitted insulating measure [AP]	Classification
All sheathed cables ≤ 80 mm	Wrapping	EI 90
All unsheathed cables ≤ 24 mm		
Cable bundles up to a diameter of 100 mm, max. individual diameter of cable: 21 mm		
Plastic conduits ≤ 16 mm, with and without cables		
Steel conduits ≤ 16 mm, with and without cables		

Cable insulation measures	Thickness [mm]	Length [mm]
Wrapping with mineral wool	20	200

Applications with EI 60

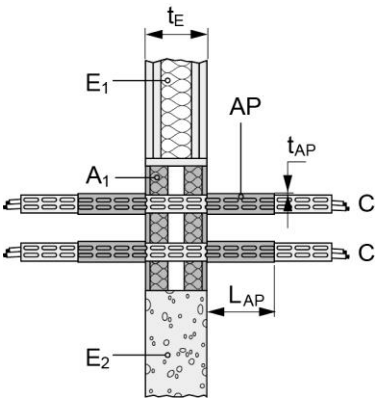


Fig. B.2: Classification with or without cable support systems

Cable	Permitted insulating measure [AP]	Classification
All sheathed cables ≤ 80 mm	Coating with Hilti Firestop Coating CFS-CT over a length of 250 mm, dry film thickness: approx. 1.5 mm	EI 60
All unsheathed cables ≤ 24 mm		
Cable bundles up to a diameter of 100 mm, max. individual diameter of cable: 21 mm		
Plastic conduits ≤ 16 mm, with and without cables		
Steel conduits ≤ 16 mm, with and without cables		

B.2 Metal pipes with mineral wool insulation in walls

Metal pipes with mineral wool insulation in walls

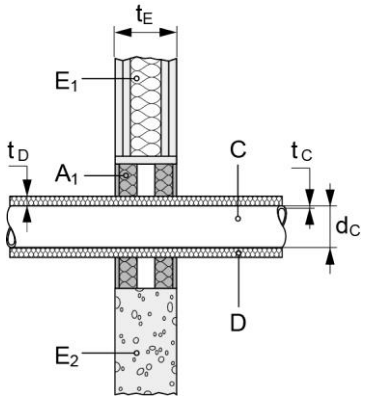
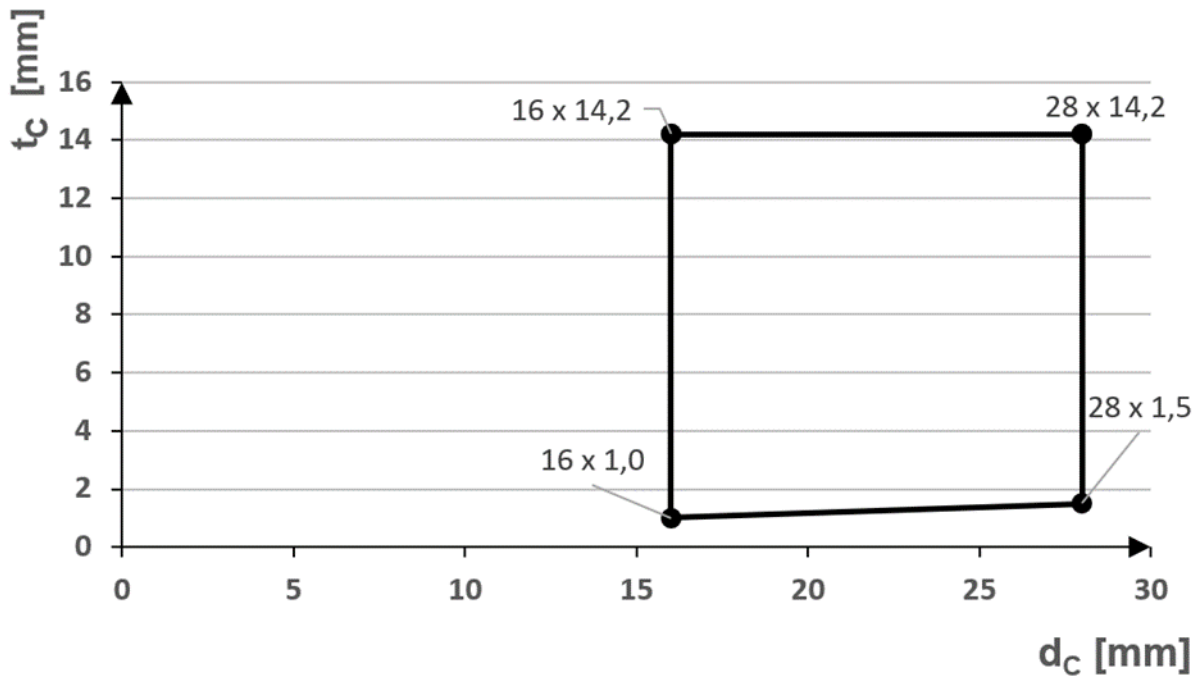


Fig. B.3: Classification with mineral wool insulation

Copper pipes

Pipe diameter / pipe wall thickness [mm]	Thickness of insulation [mm]	Insulation	Classification
16 × 1.0 – 28 × 1.5 up to 14.2 mm pipe wall thickness	20	local, continuous, length on both sides ≥ 500 mm	EI 90-C/U

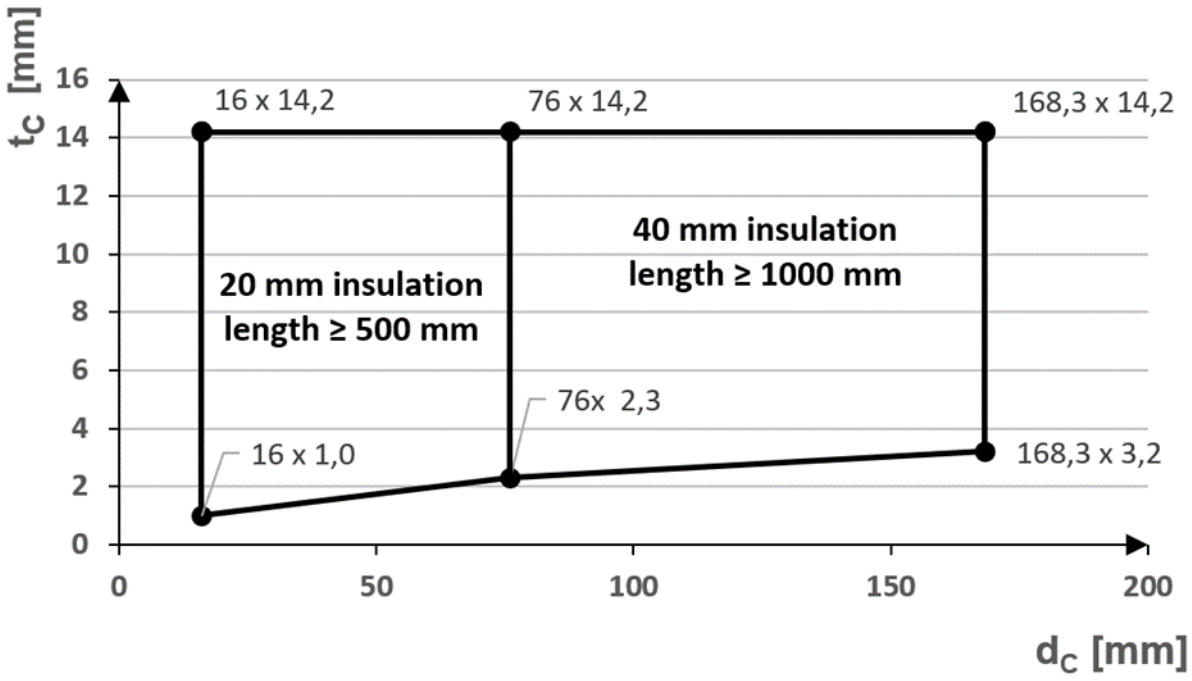
Also valid for steel, cast iron, stainless steel, Ni alloys (NiCu, NrCr, NiMo alloys) and Ni



Steel pipes

Pipe diameter / pipe wall thickness [mm]	Thickness of insulation [mm]	Insulation	Classification
16 × 1.0 – 76 × 2.3 up to 14.2 mm pipe wall thickness	20	local, continuous, length on both sides ≥ 500 mm	EI 90-C/U
76 × 2.3 – 168.3 × 3.2 up to 14.2 mm pipe wall thickness	40	local, continuous, length on both sides ≥ 1000 mm	EI 90-C/U

Also valid for cast iron, stainless steel, Ni alloys (NiCu, NrCr, NiMo alloys)



B.3 Aluminium composite pipes with combustible insulation in walls

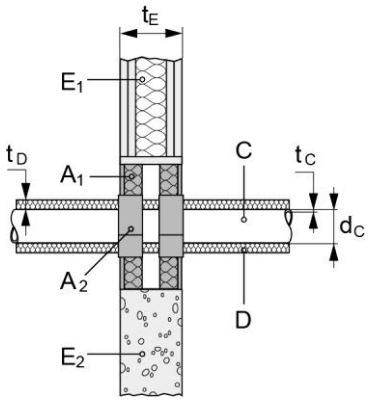


Fig. B.4: Classification with Hilti Firestop Wrap Strip CFS-W P

Pipe manufacturer / pipe name	Pipe diameter x pipe wall thickness [mm]	Insulation	Layers Firestrop Wrap Strip CFS-W P	Classification
Geberit / Mepla	16 x 2.25, 20 x 2.5, 26 x 3.0, 32 x 3.0	Continuous, elastomer 8 – 35 mm	2	EI 90-U/C
Rehau / Rautian stable	16 x 2.6, 20 x 2.9, 25 x 3.7, 32 x 4.7, 40 x 6,0	-	2	
Uponor / Uni Pipe PLUS	16 x 2.0, 20 x 2.25, 25 x 2.5, 32 x 3.0	-	2	
Kekelit / Kelox	16 x 2.0, 18x 2.0, 20 x 2.25, 25 x 2.5, 32 x 3.0	-	2	
Viega / Sanfix Fosta	16 x 2.2, 20 x 2.8, 25 x 2.7, 32 x 3.2, 40 x 3.5, 50 x 4.0 63 x 4.5	-	2 4	
Geberit / Push Fit system pipe (ML)	16 x 2.0, 20 x 2.0, 25 x 2.0	-	2	

B.4 Plastic pipes in walls
Applications with Hilti Firestop Wrap Strip CFS-W P

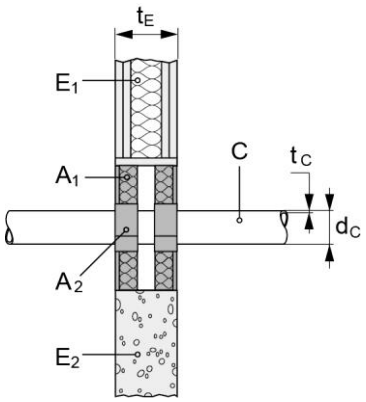
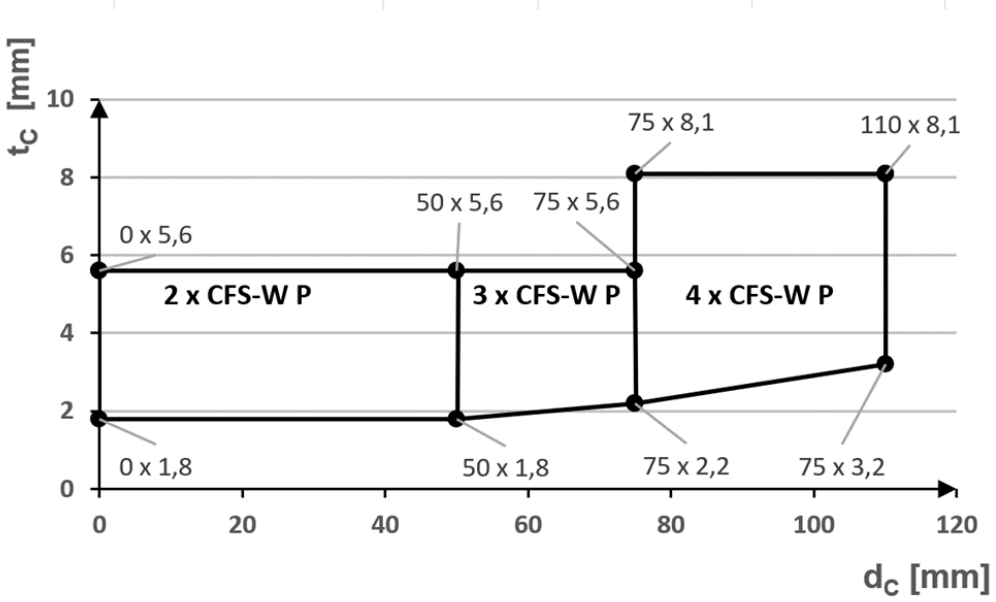


Fig. B.5: Classification with Hilti Firestop Wrap Strip CFS-W P

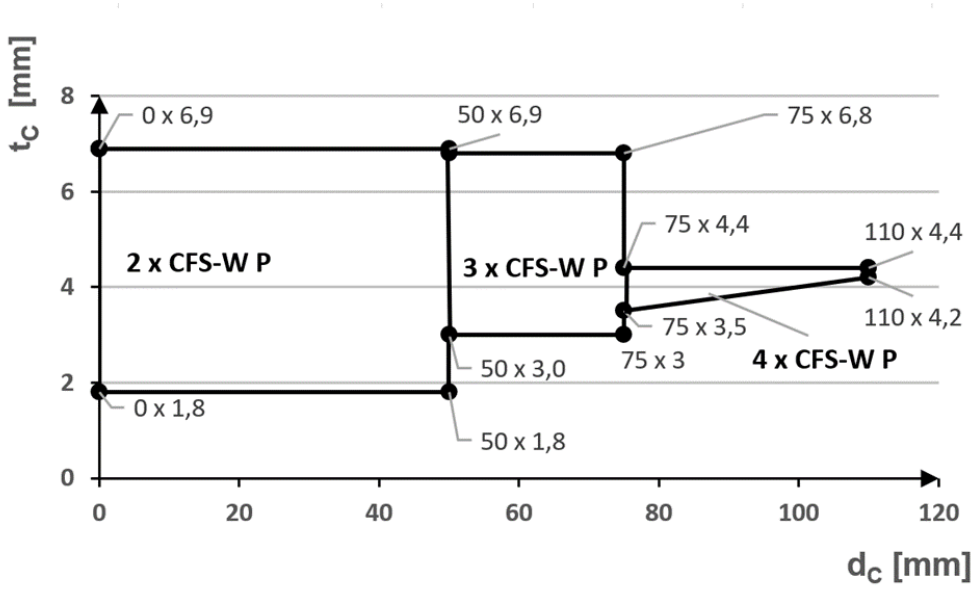
PVC and PE pipes

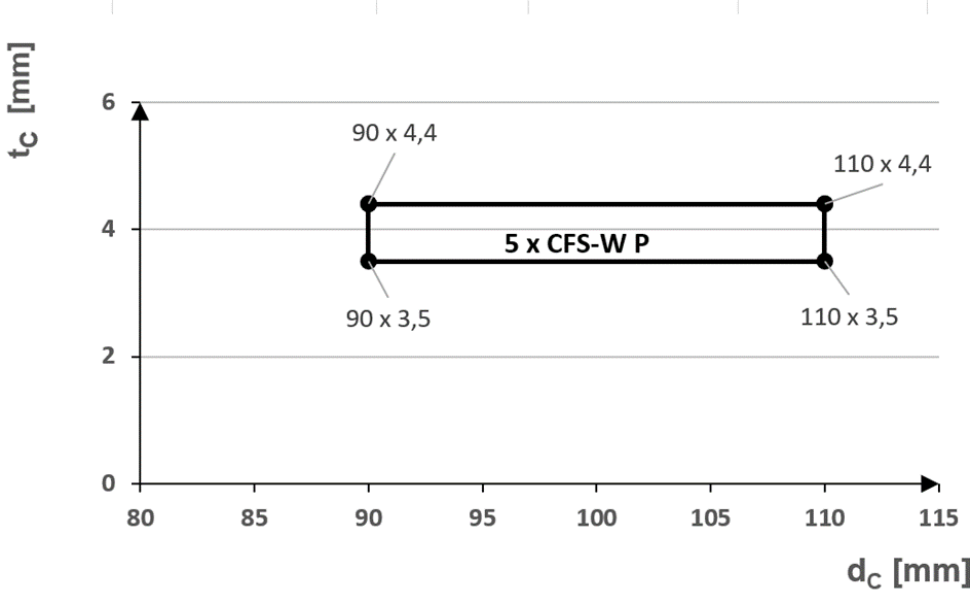
Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Layers Firestop Wrap Strip CFS-W P	Insulation	Classification
PVC pipes according to EN 1452-2	≤ 50 > 50 ≤ 75 > 75 ≤ 110	1.8 – 5.6 1.8/2.2 – 5.6 2.2/3.2– 8.1	2 3 4		EI 90-U/U
PE/PE-HD in accordance with EN 1519-1, EN 15494, EN 12201	≤ 50 > 50 ≤ 75 > 75 ≤ 110	1.8 – 6.9 3.0 – 6.8 3.5/4.2 – 4.4	2 3 4		
PE/PE-HD in accordance with EN 1519-1, EN 15494, EN 12201	90 – 110	3.5 – 4.4	5	With continued insulation (Armaflex AF), sustained over the pipe length (CS) Thickness of insulation: 9.0 – 22.0 mm	

PVC pipes according to EN 1452-2



PE/PE-HD in accord ance with EN 1519-1, EN 15494, EN 12201





Non-regulated pipes

Pipe manufacturer / pipe name	Pipe material	Pipe diameter x pipe wall thickness [mm]	Layers Firestop Wrap Strip CFS-W P	Classification
Poloplast / Polokal 3S	PP	90 × 4.5	4	EI 90-U/U
Rehau / Raupiano Plus	PP	50 × 1.8	2	
Wavin / AS	PP	58 × 4.0	2	
Poloplast / Polokal NG	PP / PP-MV / PP	75 × 3.8	3	

Pipe manufacturer / pipe name	Pipe material	Pipe diameter x pipe wall thickness [mm]	Layers Firestop Wrap Strip CFS-W P	Classification
Geberit Silent-DB20	PE-S2	56 × 3.2	2	EI 90-U/U
		63 × 3.2	3	
		75 × 3.6	3	
		110 × 6.0	4	

Pipe	Pipe diam-eter [mm]	Pipe wall thickness [mm]	Layers Firestop Wrap Strip CFS-W P	Insulation	Classification
Kekelit Kelox pipe (aluminium composite PE-X/Al/PE-X)	32	3.0	1	With continued insu-lation (Armaflex AF), sustained over the pipe length (CS) Thickness of insulation: 9.0 – 35.0 mm	EI 90-U/U
	75	7.5	2	With continued insula- tion (Armaflex AF), sustained over the pipe length (CS) Thickness of insulation: 9.0 – 40.5 mm	

Application	Minimum distance between the wraps [mm]
Wrapping with Hilti Firestop Wrap Strip CFS-W P on both sides of the penetration seal	10
For more detailed applications, see ETA 11/0429 (Hilti Firestop Coating CFS-CT, Hilti Firestop Double Board Seal) and ETA 20/0989 (Hilti Firestop Wrap CFS-W P).	

Applications with Hilti Firestop Collar Endless CFS-C EL

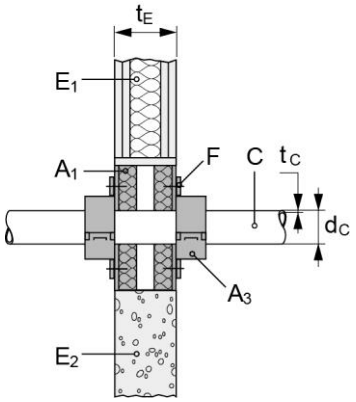
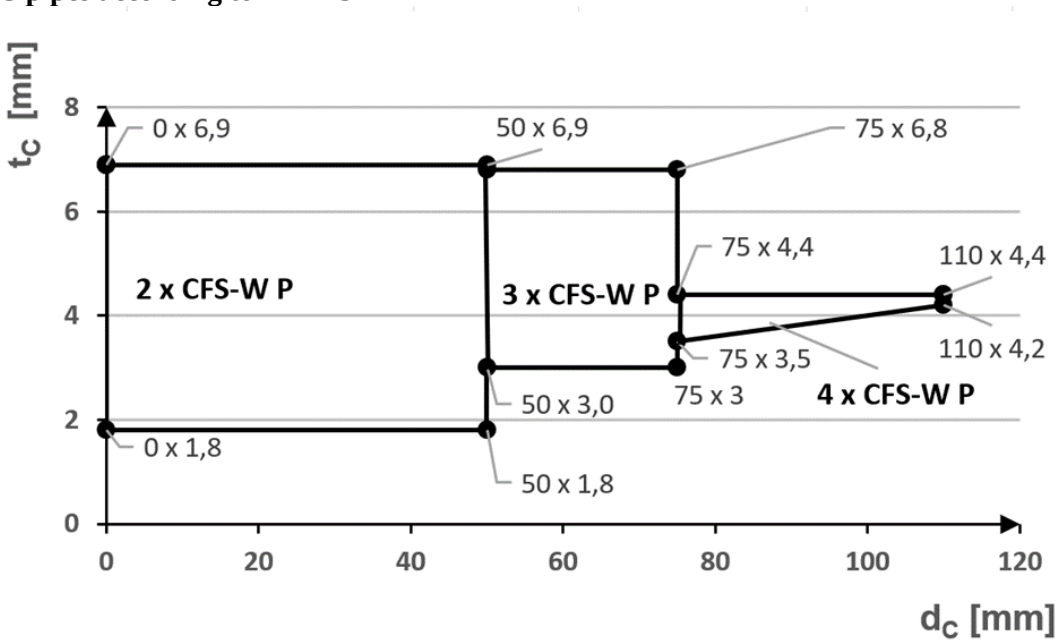


Fig. B.6: Classification with Hilti Firestop Collar Endless CFS-C EL

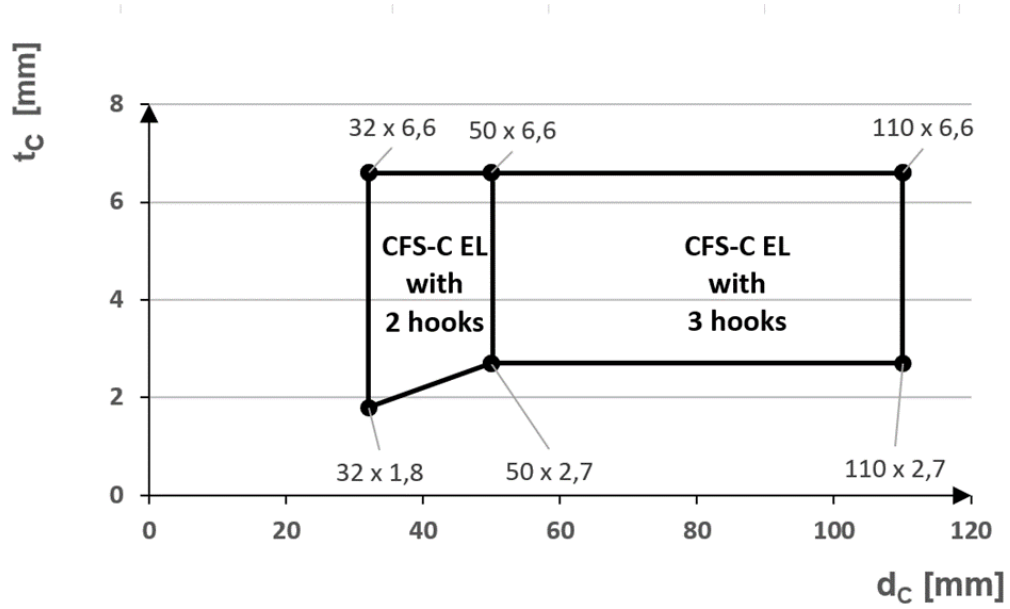
PVC, PE, ABS and PP pipes

Pipe material	Pipe diameter [mm]	Pipe wall thickness [mm]	Number of hooks on Hilti Firestop Collar Endless CFS-C EL	Classification
PVC pipes according to EN 1452-2	32 – 50 > 50 – 110	1.8/2.2 – 4.8	2 3	EI 90-U/U
PE/PE-HD in accordance with EN 1519-1, EN 15494, EN 12201 ABS pipes in accordance with EN 1455-1 PP pipes in accordance with EN 1455-1 / 8077-78	32 – 50 > 50 – 110	1.8/2.7 – 6.6	2 3	

PVC pipes according to EN 1452-2



PE/PE-HD in accordance with EN 1519-1, EN 15494, EN 12201 ABS pipes in accordance with EN 1455-1 PP pipes in accordance with EN 1455-1 / 8077-78



Non-regulated pipes

Pipe manufacturer / pipe name	Pipe material	Pipe diameter x pipe wall thickness [mm]	Number of hooks on Hilti Firestop Collar Endless CFS-C EL	Classification
Poloplast / Polokal NG	PP / PP mineral reinforced / PP (Z-42.1-241)	32 × 1.8	2	EI 90-U/U
Rehau / Raupiano Plus	PP / PP mineral reinforced / PP (Z-42.1-223)	75 × 1.9 110 × 2.7	3	
Wavin / AS	PP mineral reinforced (Z-42.1-228)	110 × 5.3	3	
Geberit Silent-DB20	PE-S2	56 × 3.2 75 × 3.6 110 × 6.0	3 3 3	

Annex C
Acoustic performance

Single number ratings are:

Flexible wall:

	CFS- CT B 1S 2x50 mm	CFS- CT on MW board 2x50 mm
Nominal density of board [kg/m^3]	140	160
No. of board faces coated	1	1
Air gap between boards [mm]	55	55
Specimen size [mm x mm]	400 x 500	400 x 500
$D_{n,e,w}$ (C; Ctr) [dB]	58 (-4;-8)	60 (-4;-9)
R_w (C; Ctr) [dB]	51 (-4;-8)	53 (-4;-9)

Test setup: Structure of the flexible wall: 2 x 12.5 mm plasterboard on both sides of a 50 mm metal stud frame. The void was filled with a 40 mm mineral wool slab. Several variations have been tested: the pre-coated board CFS-CT B 1S as well as other mineral wool boards coated with CFS-CT, single and double layer seals, the latter with and without air gap between the boards. The coating thickness was 1 mm for boards coated on both sides and 0.7 mm for boards coated on 1 side only. The joints around the board have been sealed with Hilti Firestop Acrylic Sealant CFS-S ACR.

Annex D

Abbreviations

A_1	Mineral wool board coated with Hilti Firestop Coating CFS-CT or Hilti Firestop Coated Board CFS-CT B 1S
A_2	Hilti Firestop Wrap Strip CFS-W P
A_3	Hilti Firestop Collar endless CFS-C EL
AP	Additional protection for services
C	Penetrating services
D	Pipe insulation
d_C	Pipe diameter
E_1, E_2	Building element (wall)
F	Fixing of pipe closure device
L_{AP}	Length of the additional protection
t_{AP}	Thickness of additional protection
t_c	Pipe wall thickness
t_D	Thickness of pipe insulation
t_E	Thickness of the building element